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Magnetical and meteorological observations, made at Washington, under orders of the Secretary of the Navy, dated Aug. 13, 1845. By Lieut. J. M. Gilliss, U. S. N. pp. 648. Washington, 1845. From Lieut. Gilliss.

The History of the Institution, design, and progress of the Royal Society of London. 8vo. From Jacob Tremper, Esq.

Communications were read—

From Mr. Tremper, presenting the above work.

From Mr. Henry Wheatland, dated Salem, Mass., Nov. 10, 1845, requesting on behalf of the Essex Co. Natural History Society of that State, the transmission of the Nos. of the Proceedings of the Academy as they may be published.

From Mr. C. B. Adams, of Middlebury, Vermont, dated Nov. 20, 1845, asking for late Nos. of the Proceedings containing descriptions of N. American Coleoptera.

Stated Meeting, Dec. 16, 1845.

VICE PRESIDENT MORTON in the Chair.

DONATIONS TO LIBRARY.

Boston Journal of Natural History, Vol. v. No. 2. Boston, 1845. From the Boston Society of Natural History.

Report of the Commissioners to examine the sources whence a supply of pure water may be obtained for the city of Boston. Boston, 1845. From Prof. Johnson.

Also charts of Long Pond and Spot Pond, surveyed under the direction of John B. Jervis, C. E., and Prof. Walter R. Johnson, Commissioners. From the same.

Maps of the vicinity of Boston, showing the sources of water for supplying the city. From the same.

Proceedings of the American Philosophical Society, vol. 4, No. 33. May to Aug., 1845. From the Society.

Extraits d'une lettre de M. Frénel a M. Jomard sur certains quadrupèdes réputés fabuleux. Paris, 1844. From Geo. R. Gliddon, Esq.

A letter was read from N. S. Benton, Esq., Secretary of State of New York, dated Albany, Dec. 5, 1845, in answer to one addressed to him by the Corresponding Secretary, in accordance with a resolution of the Society, directing application to be made for a complete copy of the Natural History of that State for the Library. The Society was informed that no copy was at present at the disposal of the Department.

A paper, by Alfred T. King, M.D., of Greensburg, Pennsylvania, entitled, "Descriptions of fossil foot prints," was read and referred to the following Committee, viz.: Prof. Johnson, Dr. Morton and Mr. Cassin.

Professor Johnson communicated some observations on the relative evaporation from land and water surfaces, and stated the means by which the question had been investigated, referring to the report, a copy of which was presented to the Academy at the last meeting, concerning the water sources near Boston, for a portion of the details of experiments and observations, by which the ratio in question had been established.

The method of research was stated to have comprised, 1st, an observation of the quantity of water falling in rain;—2d, the quantity flowing away by the outlet of the source;—3d, the depth removed from the surface of water by evaporation; and 4th, the relation between the area of ground covered by water, and of that constituting the water shed or drainage, from which, owing to the direction of its slope, the rain falling upon it, must necessarily pass into the pond or lake, constituting the source of immediate supply. The plan pursued required of course a determination by actual surveys, of the total area of ground embraced within the district or hydrographic basin, and also that of the water surface at several different stages of height correspond-

ing to the several periods of observation, in order to establish the ratio above referred to, between the land surface and the water surface at each of those periods.

With these data, and a simple formula of easy application, it will be found practicable, not only to establish the ratio of supply from the surrounding slopes, to the whole quantity of rain falling during a season, but also the ratio which evaporation on land, bears to that on the water surface.

The quantity, or bulk of water, removed from any source, such as a lake or pond, during any given period of observation, will consist of *first*, the *draught*, or flow from the outlet, and *second*, of that removed by *evaporation*.

This quantity, determined by actual gauging, is readily referred to the known area of water-surface, simultaneously observed—and the depth to which it would cover the same surface if again restored, is thereby ascertained.

The supply of this quantity may be derived from 1st, the *store* previously accumulated in the pond or lake ; 2d, from *rain* which falls directly on the *water-surface* during the period of observation ; or 3d, from the *drainage*, or flow from the surrounding slopes.

When the level of the lake falls during the period of observation, it is evident that something has been taken from the accumulated *store*, and if the amount of depression of level, and the depth of *rain* gauged, be not together equal to the sum of *draught* and *evaporation* observed, it is evident that the *third* source of supply—viz : the *drainage* from the water-shed, must have furnished the balance. If, on the other hand, the level of the source have risen, something has been added to the store of water previously accumulated ; and in this case the depth of *rain* and the supply from the *water-shed*, have exceeded the sum of *draught* and *evaporation*, and the measures of level and of area show the amount of this excess. In either case the supply derived from the surrounding slopes is easily eliminated, since all the other terms of the equation are known.

From the 7th of August, to the 1st of November, of the present year,—the time in which the observations, surveys and gaugings, required for the purposes above designated, were made in the district of Spot Pond, 9 miles north west from Boston,—the depth

of rain gauged was 10.17 inches; the evaporation from the surface of the pond was 15.07 inches, showing the evaporation to be 48.1 per cent. more than the depth of rain. By an average of five periods of observation into which this time was divided, the ratio of water derived from the slopes, to the rain which fell upon them was .1765 to 1., or the actual depth was 1.79 inches. Consequently, the evaporation from the land, and from its vegetable covering, was .8235 of the rain which descended. Hence the ratio between the evaporation from land, and that from water, was $.8235 : 1.481 = .556 : 1$.

In the district of Long Pond, 18 miles south west from Boston, from the 30th of July to the first of November, the depth of rain was 10.46 inches; and of evaporation 12.78 inches—consequently the evaporation was 22.2 per cent. more than the rain.

The water derived from the slopes of the district was .1839 of the whole fall of rain, leaving .8161 : 1 as the proportion evaporated from the land, or appropriated by vegetation, and the ratio of evaporation from land to that from the water, was consequently $.8161 : 1.222 = .667 : 1$.

It appears from comparisons of the annual falls of rains for long periods of years, that the quantities of rain above stated, as having fallen in the months of August, September, and October last, at the two sources mentioned, are about the average quantities due to those months, and that consequently the ordinary ratio which, in the neighborhood of Boston, and at the season above specified, may be expected to flow from the land, and be available in water sources is $\frac{.1765 + .1839}{2} = .1802$ or almost exactly 18 per cent. At other seasons, very different proportions between the quantity of rain, and that of evaporation, would be found to prevail. Whether in the winter season, the same ratio would be found to exist between the evaporation from land, and that from a water surface, as has been found to prevail in summer, is a question still awaiting a practical, experimental determination. The same methods of research, as have been applied in the above cases, would be found applicable to its solution, substituting only in part the fall of snow gauged as water for that of rain, and the evaporation from a surface of ice for that from a surface of water.

The elevated and insulated position of Spot Pond, resting in a

basin composed of igneous rocks, and these partly bare of vegetation, was referred to, as favoring the continuance of the water which falls upon the slopes, for a considerable time in contact with the air, and subjected to evaporation before it reaches the pond. This was considered adequate to account for the small difference $.1839 - .1764 = .0064$ between the drainage from that district, and the one found at Long Pond.

Stated Meeting, Dec. 23, 1845.

VICE PRESIDENT MORTON in the Chair.

DONATIONS TO LIBRARY.

Memoir on the copper region of Gibara, and of the geology of the N. E. part of the Island of Cuba, with a reconnaissance map. By Richard C. Taylor. From the Author.
Notice of Fossil Arborescent Ferns, of the family of Sigillaria, in the coal formation of Pennsylvania, with an illustrative drawing and map. By Richard C. Taylor. From the Author.

A communication was read from Mr. Edward Harris, entitled "Description of a new species of Parus, from the Upper Missouri," and referred to a committee, consisting of Messrs. Cassin, Townsend and Woodhouse.

A letter was read from Jacob Tremper, Esq., dated Dresden, Yates Co., New York, returning acknowledgments for his election as a Correspondent.

Prof. Johnson read the conclusion of his report of an examination and analysis of the alluvial soil of the Nile, from Korosco in Nubia.

The report was adopted, and referred for publication to the Committee on Proceedings.